


Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bangalore

	Course Title: MECHANICAL COMPUTER AIDED DRAFTING (MCAD)		
	Scheme (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15ME35P
	Type of Course: Tutorial and practice	Credit : 03	Core/ Elective: Core(practice)
CIE- 25 Marks		SEE- 50 Marks	

Prerequisites: Basic computer Skills and Practice concepts of Machine drawing

Course Objectives:

1. Now a day a manual drafting is obsolete in industry. Computers being the inevitable part in an engineer's life due to its inbuilt characteristics which helps him to do various task with acceleration.
2. Using computers and CAD software it is easy to create and modify drawings ultimately it saves time. It also may be useful to generate assembly and manufacturing drawings.
3. In mechanical industry operating skills are required for computer aided drafting operations of machine components, handling of printers & plotters. This subject is also useful to apply concepts in 3 D modeling.

On successful completion of the course, the students will be able to:

Course Outcome		CL	Linked excises	Linked PO	Teaching Hrs
CO1	Interpret and Draw, edit and modify 2D	U/A	Basics	1,2,3,9,10	08
CO2	Give dimensions, tolerances and geometrical tolerances	U/A	Basic commands	1,2,3,9,10	08
CO3	Create Isometric 2D Views and 3D drawing ,when orthographic views of simple machine parts/Threaded fasteners /Riveted Joints	U/A	Models from question bank (Sl.no 01 to 16)	1,2,3,9,10	18
CO4	Plot Assembly 2D drawings and Create their respective 3D Assembled views	U/A	Part drawings from question bank (Sl.no 01 to 05)	1,2,3,9,10	44
				Total sessions	78

Legend: U- Understand A- Application

COURSE-PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
MECHANICAL COMPUTER AIDED DRAFTING (MCAD)	03	03	03	-	-	-	-	-	03	03

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
 If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
 If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
 If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
 If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENT

Unit No	Unit Name	Hour	Questions to be set for (10marks) PART - A	Questions to be set for (40marks) PART - B	Marks weightage (%)
1	CAD COMMANDS FAMILIARIZATION	08	----	-----	-
2	PRACTICE ON COMMANDS	08	01	----	17
3	CREATION OF 3D MODELS /THREADED FASTENERS/ RIVETED JOINTS	18	01	-----	17
4	DETAILS TO ASSEMBLY	44	----	01(*)	66
	Total	78	02	01	100

Note: (*): Compulsory Question to be asked in end exam

UNITI: CAD COMMANDS FAMILIARIZATION 08Hrs

Introduction to MCAD(parametric modelling) software-Understanding parametric modelling technique, knowing the software interface, co-ordinate systems supported- Planes and their creation, reference axis, Sketch, Profile, constraints-geometrical and dimensional, need for constraining, fully constrained, under constrained, over constrained.

UNTII: PRACTICE ON COMMANDS 08Hrs

Practice 2D and 3D drawing commands

Hands on Exercises.

Create 2D Drawing for the ISOMETRIC OBJECT given by selecting from model question bank

Create 3D Drawings for the ORTHOGRAPHIC VIEWS given by selecting from model question bank

UNIT III: ASSEMBLY MODELING 44Hrs

Know the assembly environment, setting the assembly environment, types of assembly design approach-bottom-up and top-down assembly. Creating assembly Editing and modifying assembly relationships -Creating exploded view of the assembly –Create 3D Assembly models of- **Socket and Spigot type Cotter Joint-Knuckle joint—Plummer Block- Screw Jack**

UNIT IV: MODELS BY USING EQUATIONS

18Hrs

Hexagonal nut and bolt, Solid muff coupling and journal bearing



TEXT BOOKS

1. Sham Tickoo- Autocad: A Problem-Solving Approach Thomson Learning EMEA, Limited
2. Machine Drawing- K.R.Gopala Krishna Subhas Publications Bangalore
3. George Omura- Mastering Auto CAD BPB Publication
4. T Jeyapooan- Engineering Graphics Using AutoCAD Vikas Publishing House Pvt. Ltd. Fifth Edition

REFERENCES

1. Machine Drawing- N.D.Bhatt, Charotar Publication, Anand
2. Machine Drawing-Sidheshwar-Tata McGraw Hill
3. Code of practice for general engineering-IS Code SP 46(1988)- Engineering Drawing Practice for School and colleges
4. Production Drawing-L.K.Narayanan,P.Kannaich,- New Age International Publication

SUGGESTED LEARNING WEB SITES

<http://www.we-r-here.com/cad/tutorials/index.htm>
<http://www.cadtutor.net/tutorials/autocad/>
http://www.caddprimer.com/AutoCAD_training_tutorial/AutoCAD_training_lessons.htm
<http://www.autocadmark.com/>
<http://www.autocadtutorials.net/>

SUGGESTED LIST OF STUDENT ACTIVITIES

1. Each student should submit any one of the following type activity or any other similar activity related to the course and before take up get it approved from concerned Teacher and HOD.
2. Each student should conduct different activity and no repeating should occur

1	Bring actual industrial production drawings from nearby industry and distribute them among group of students for self study and interpretation. Ask students to practice these drawings using any modeling software.
2	Bring small real components like Nut-Bolt, Washers, Cotter-knuckle Joints, Couplings, and Pulleys in the class. Ask students to use Vernier caliper to measure the dimensions and formulate relations between them. Practice same relations with AutoCAD/Pro-E software/Solid edge/catia to draw 2D/3D models of these components.
3	Take the students for industrial visit. Hands-on practice with drafting software to create a production drawing of an assembly.

Course Delivery:

The course will be delivered through lectures and Demonstration and CAD practices. This Lab can be performed using ANY ONE of the following software's:

- 1) Solid edge
- 2) Iron CAD
- 3) CATIA
- 4) ProE
- 5) Solid Works
- 6) INVENTOR
- 7) Any equivalent or open source software's

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment meth	CIE	IA	Students	Student activities	10	CAD drawing	1,2,3,4
				Record- Average marks of all graded exercises to be computed.	15	CAD exercises	1,2,3,4
	SEE	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Note:

1. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

• MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY

RUBRICS MODEL

RUBRICS FOR ACTIVITY(10 Marks)						
Dimension	Unsatisfactory	Developing	Satisfactory	Good	Exemplary	Student Score
	2	4	6	8	10	
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
Fulfil team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	6
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	8
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	8
Average / Total marks=(4+6+8+8)/4=26/4=6.5=7						

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the given activity.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	% Weightage
1	Understanding	45
2	Applying the knowledge acquired from	40
3	Analysis	05
4	Evaluation& Creating new knowledge	10

Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester

1. Student suggested activities report for 10 marks
2. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

Scheme of Valuation for End Examination

Sl no	Questions	Marks
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1	Create the model and drawing views(any 3) along with dimensions and annotations as per sketch given	10
OR		
	Create the model and drawing views(any 3) along with dimensions and annotations using equations	10
2	Create the assembly model and drawing with dimension, BOM, - as per the given sketch(*): Compulsory Question to be asked in end exam	40
	Total	50

EQUIPMENT LIST:

1. Latest Configuration Computers which can be able to run latest any Computer Aided Drafting Software. (At least One Computer per student in practical session.)-20 no
2. Any latest Authorized Computer Aided Drafting Software (20 copies)
3. Plotter of size A2/A3
4. LCD Projector

MODEL QUESTION PAPER

III Semester Diploma in Mechanical Engineering **MECHANICAL COMPUTER AIDED DRAFTING (MCAD)**

Time: 3 Hours

[Max Marks: 50]

Note: Answer any ONE from **Part A** and **Part B** is compulsory

Part A

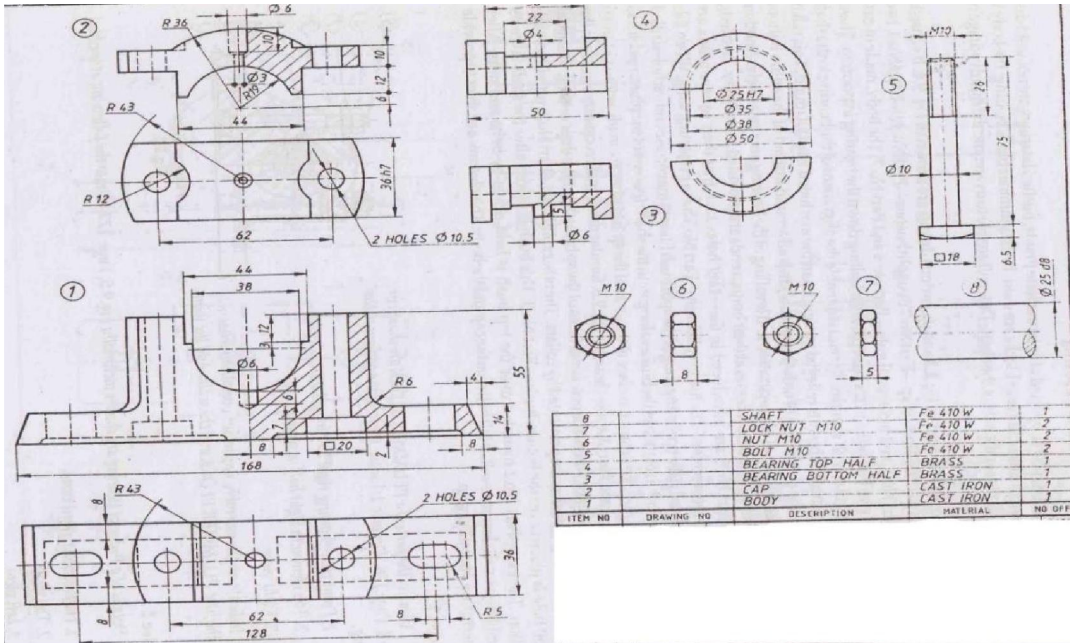
1. Create front, top and side view for the given 3D Drawing -10M

OR

Create the 3D Part model for the given 2D Drawing-10M

Part B

1. Create 3D Assembly models of a **PLUMMER BLOCK** for the given detail parts. -40M

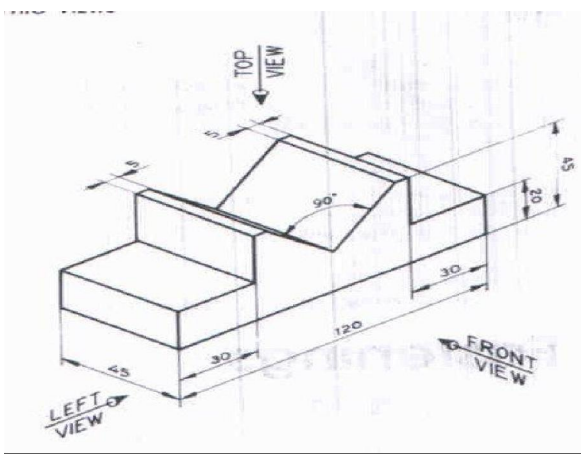


MODEL QUESTION BANK

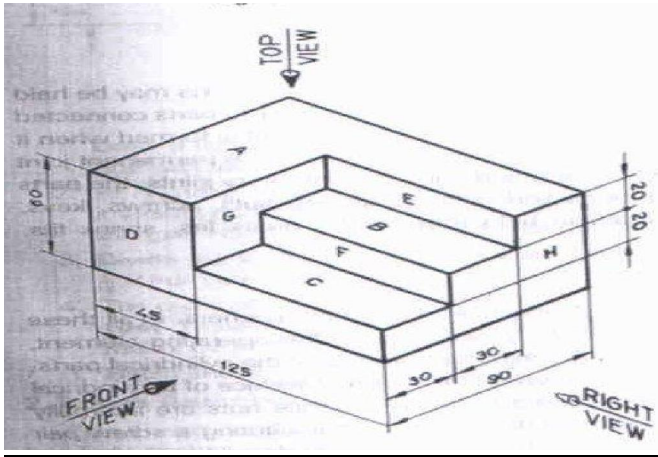
III Semester Diploma in Mechanical Engineering MECHANICAL COMPUTER AIDED DRAFTING (MCAD)

PART-A (10 MARKS QUESTIONS)

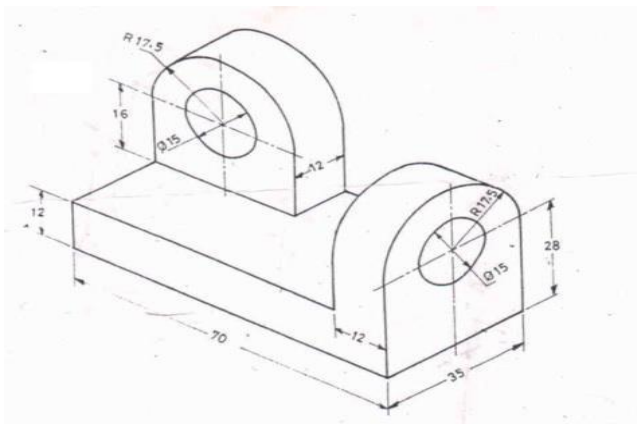
1. Create front , top and side view for the given 3D Drawing.



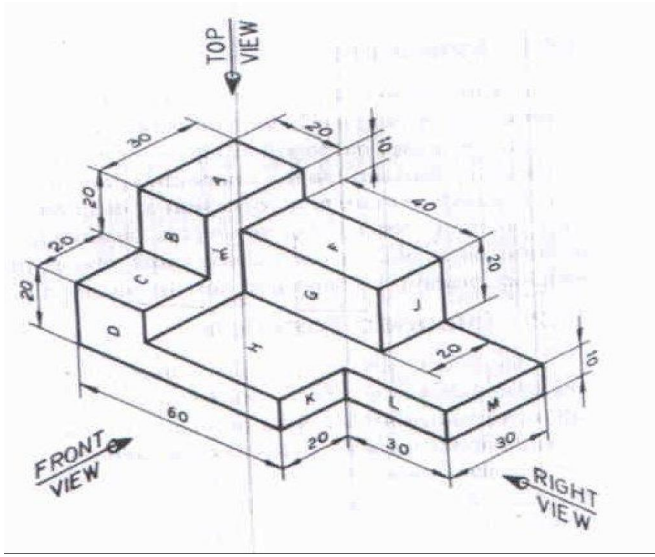
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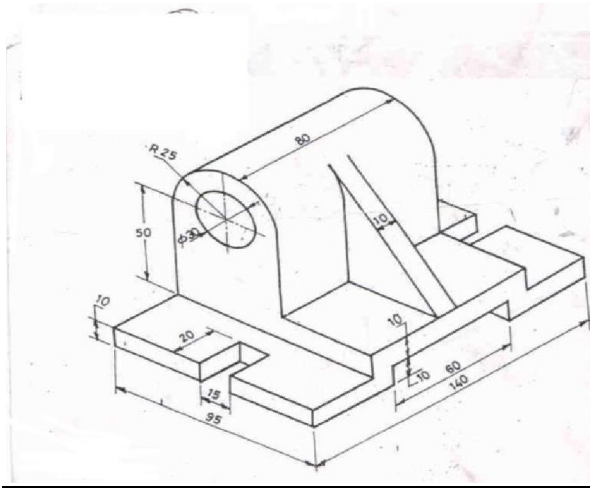
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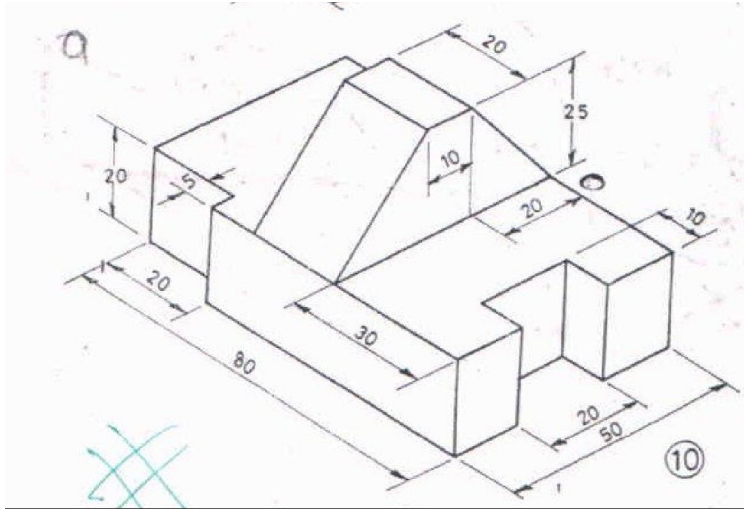
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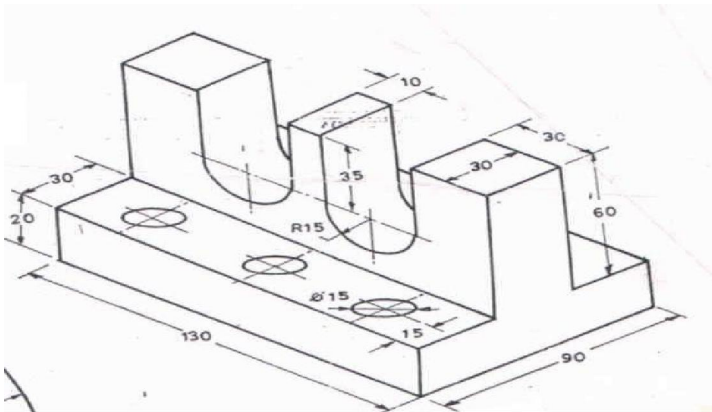
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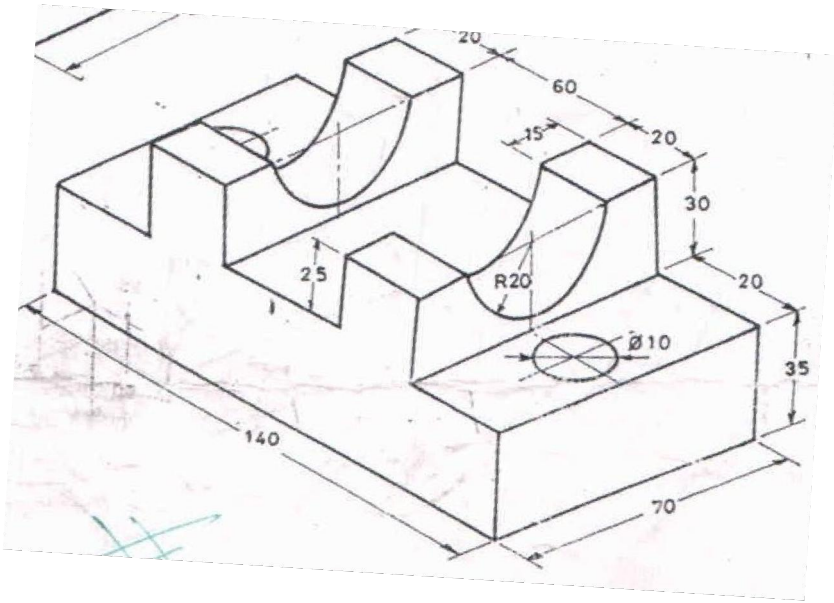
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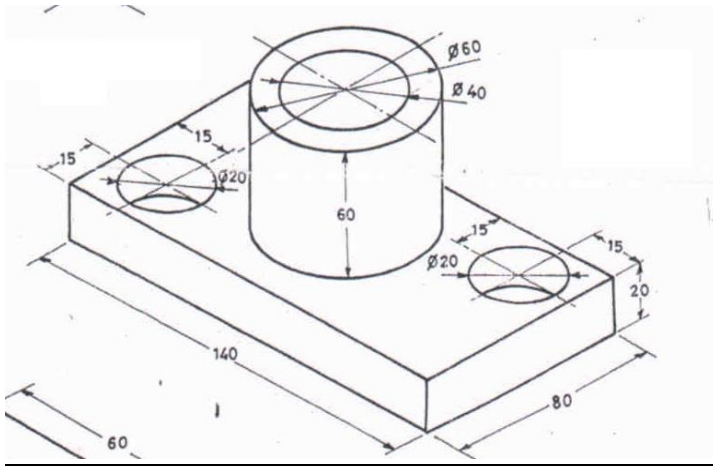
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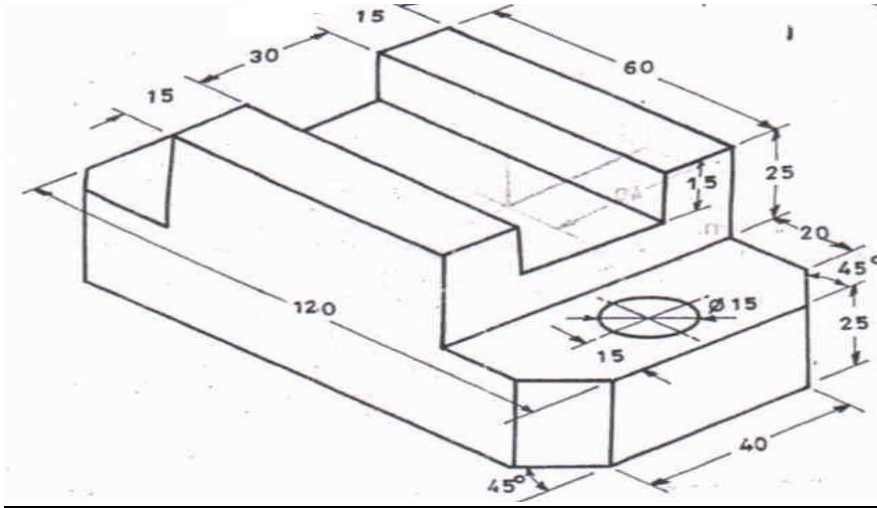
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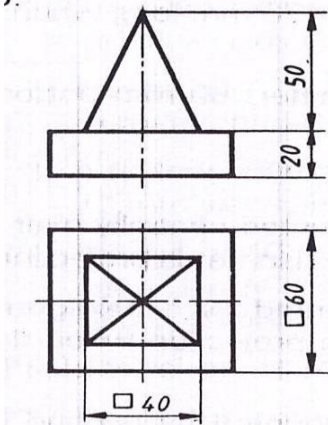
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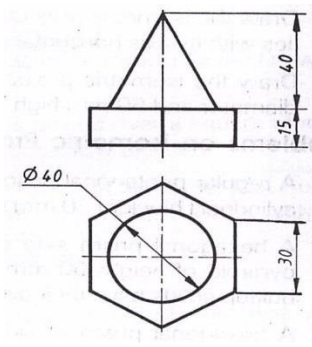
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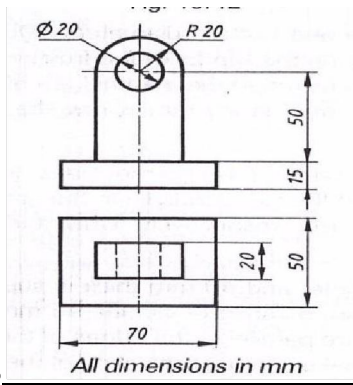


11. Create the 3D Part model for the given 2D Drawing

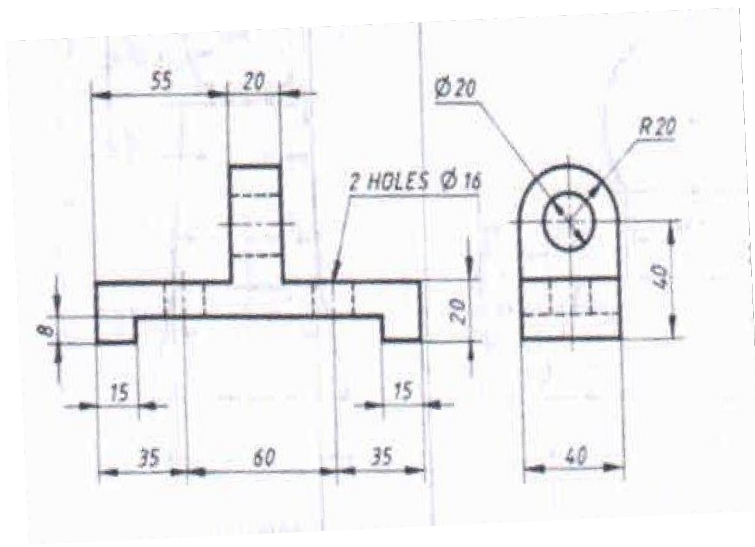


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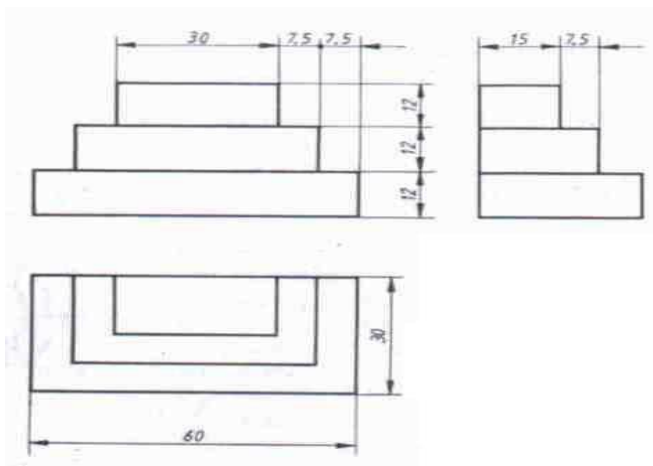




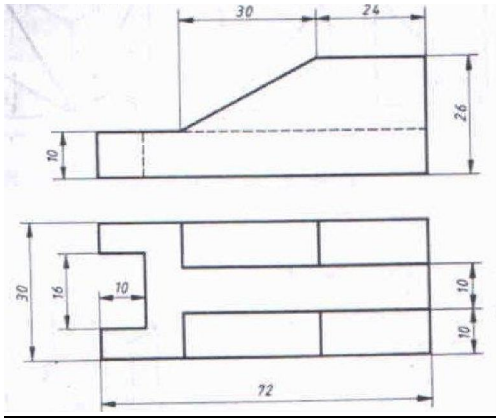
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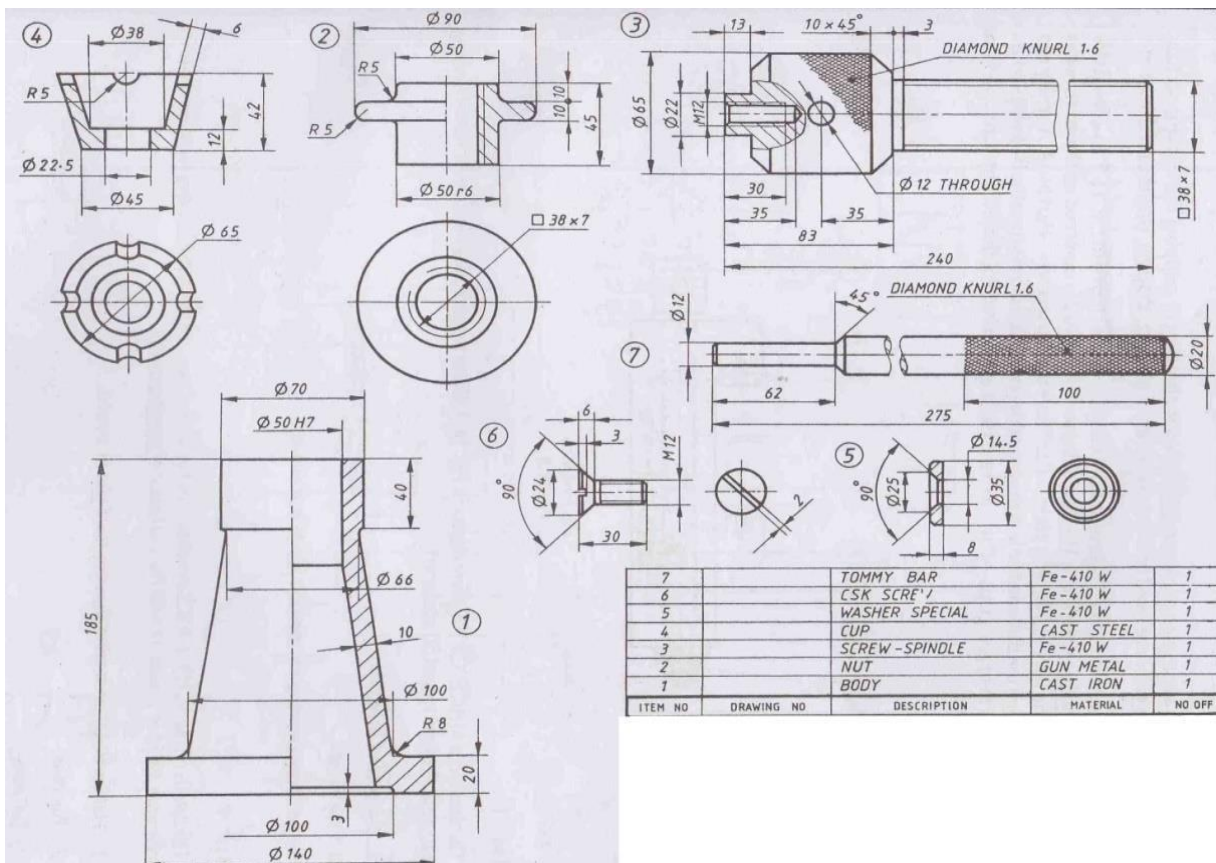


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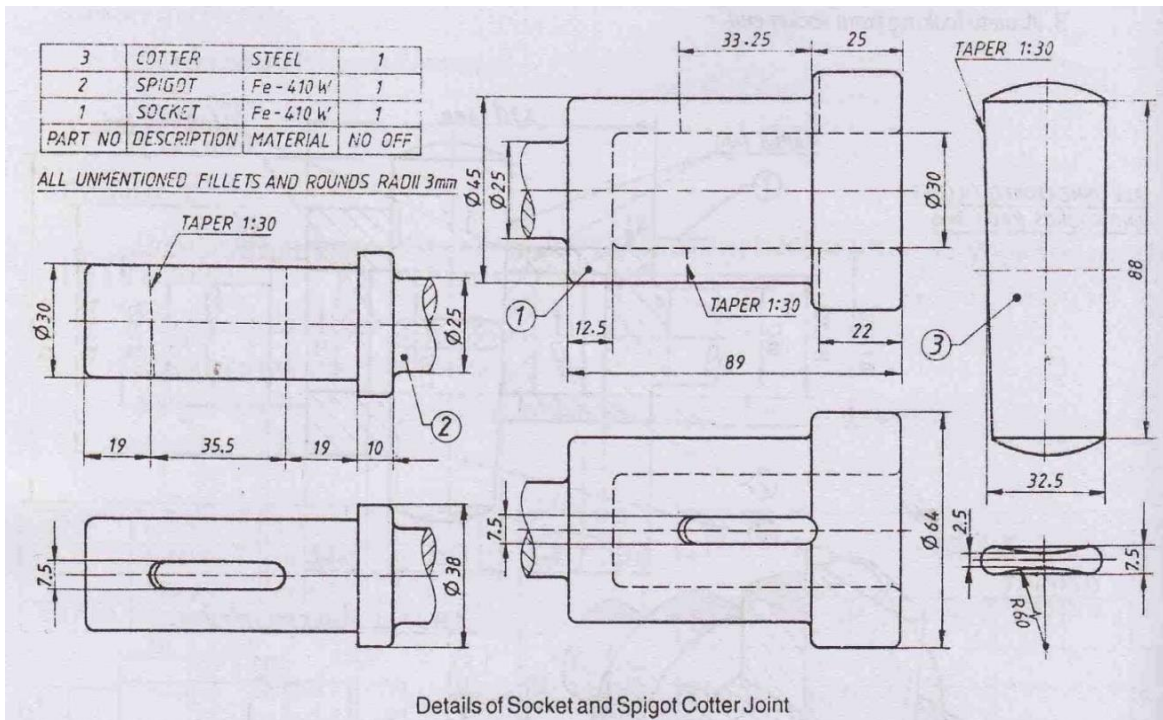
Part B

1. Create 3D Assembly models of a **SCREW JACK** for the given detail parts.



2. Create 3D Assembly models of a **PLUMMER BLOCK** for the given detail parts.

4. Create 3D Assembly models of a **SOCKET AND SPIGOT COTTER JOINT** for the given detail parts.



5. Create 3D Assembly models of a **BUSHED BEARING** for the given detail parts.

